

to Dr. J. C. Arthur for kindly comparing this with other possibly allied species and for material contributed.—H. HAROLD HUME, *Lake City, Fla.*

## THE TAXONOMIC VALUE OF THE STAMINATE FLOWERS OF SOME OF THE OAKS.

(WITH EIGHT FIGURES)

THE flowers of the oaks have received comparatively little attention from investigators in systematic botany. Most authors have described the flowers of a single species, usually *Quercus alba*, which they have considered as a type for the entire genus. Sargent in his *Silva* has given a brief description of the flowers of each species, but the degree of variation in the form of the lobes and the amount of pubescence is hardly touched upon.

The present study was undertaken in order to determine whether there was not a wider range of forms among the flowers, and, if so, whether this variation is constant enough to aid in the separation and limitation of the species. For this purpose the staminate flowers of the oaks in the Cayuga Flora (*Q. acuminata*, *Q. alba*, *Q. platanoidea*, *Q. Prinus*, *Q. macrocarpa*, *Q. rubra*, *Q. coccinea*, and *Q. velutina*) were chosen.

Staminate flowers were collected from as many trees of each species as possible at anthesis. The flowers were opened, the stamens removed, and the perianth mounted in glycerine jelly. In order to determine the limits of the midrib it was found of assistance to warm the slide after mounting.

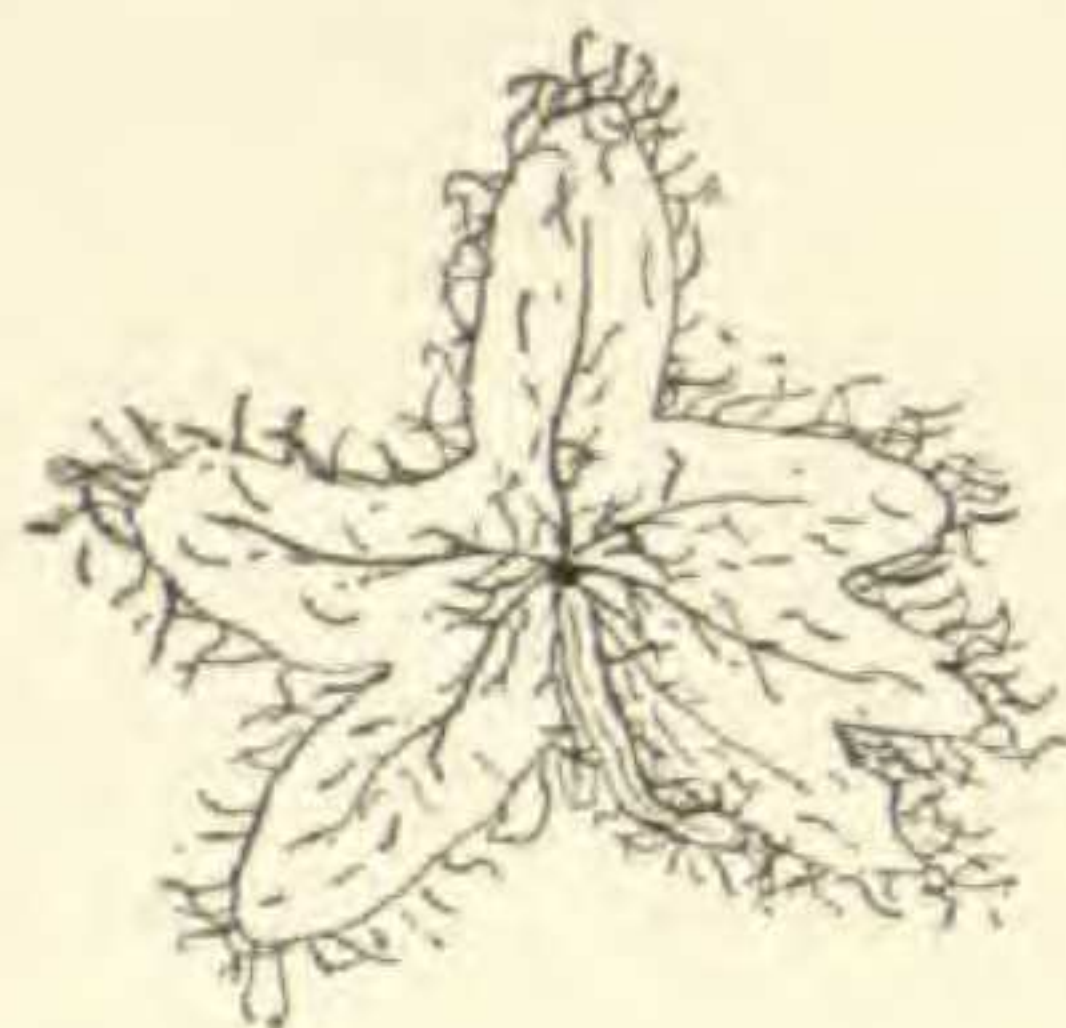
The oaks may be divided into two groups, one containing those which require a single season for maturing their fruit, the other requiring two seasons. Of the oaks enumerated above the first five belong to the first group, the last three to the second. This same division is substantiated by a study of the floral organs.

The first group has a six-lobed perianth that is campanulate to rotate, and has six to nine stamens. The second group is easily distinguished from the first by its closely campanulate perianth, and the stamens are four or five in number. The different species in each group may be distinguished by the size and shape of the lobes, the amount of pubescence, and the presence or absence of a midrib.

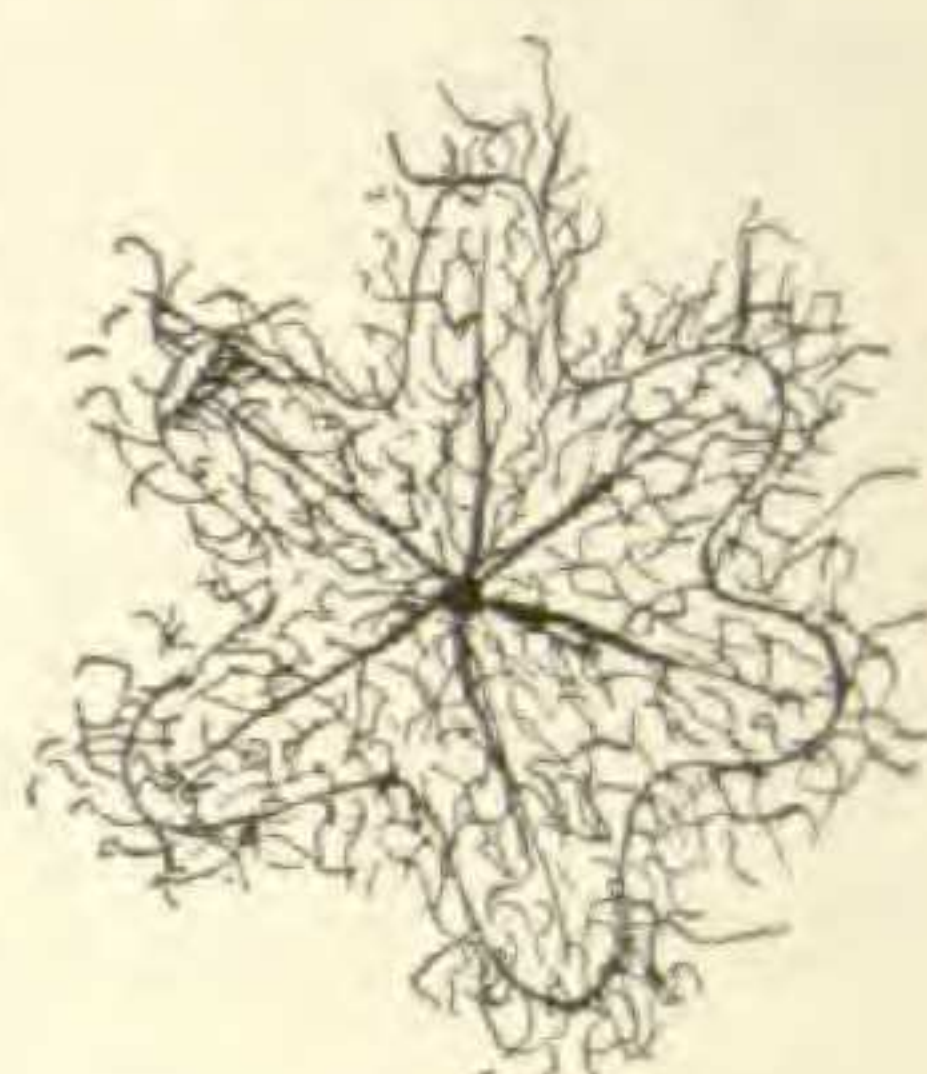
*QUERCUS ACUMINATA*.—This species has a six-lobed, thin, and delicate rotate perianth, which is 3<sup>mm</sup> in diameter. The lobes are usually



somewhat unsymmetrical, two or three being close together and separated by narrow sinuses, the others are more widely separated and the sinuses are correspondingly wider and deeper. This appearance is often due to tearing in mounting, but the natural lobing may be determined by tracing the cilia along the margin. The lobes are ovate to

FIG. 1.—*Q. acuminata*.

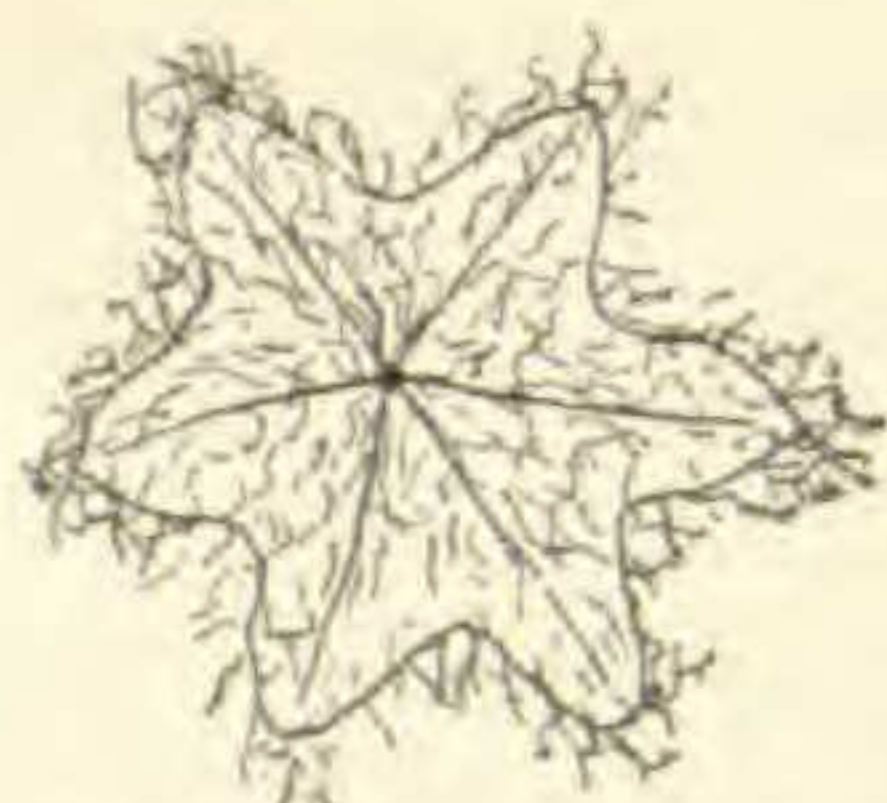
lanceolate and obtuse. One of the lobes is frequently somewhat broader than the others, and once or twice notched near the apex. The midrib is distinct and extends a little over one third of the length of each lobe. The perianth is pilose, and the hairs are usually

FIG. 2.—*Q. alba*.

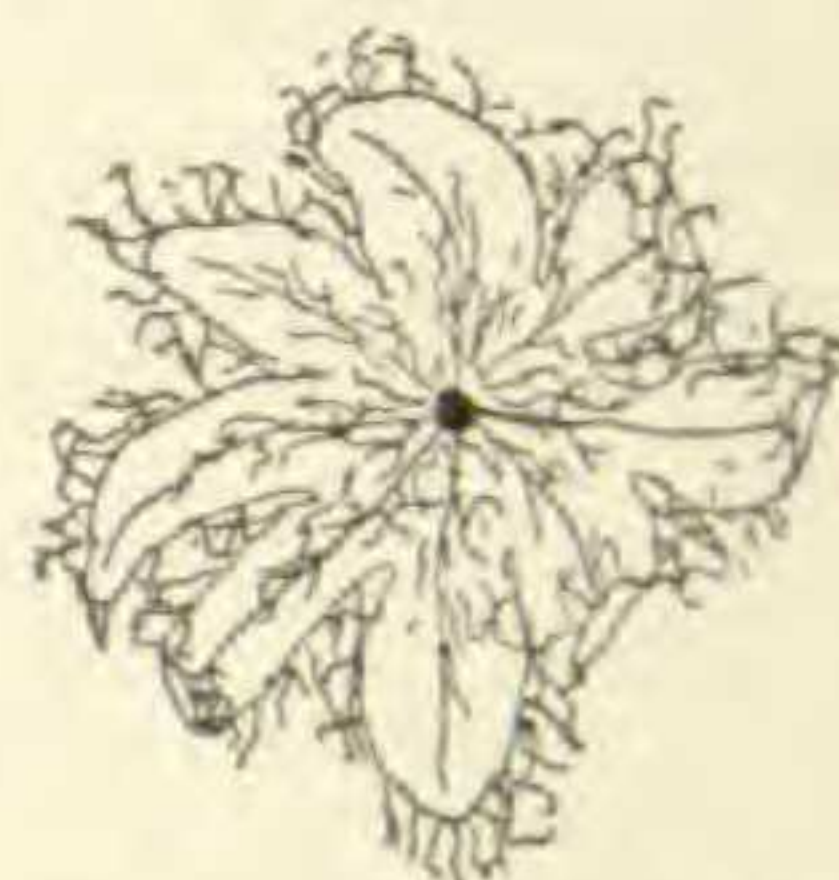
tinted with red. The bract is persistent, and adheres closely to the flower when the latter is removed from the catkin. This is the only species of this region that does not lose the bract before the maturing of the flower.

**QUERCUS ALBA.**—The flowers of *Q. alba* are very symmetrical in outline, thus forming a strong contrast to the preceding species. The perianth is slightly campanulate, thin, delicate, and five or six-lobed. The diameter is 2–3<sup>mm</sup>. The lobes are small, broadly oval to ovate, and obtuse. The midrib is prominent and distinct nearly to the apex of the lobes. The perianth is densely pilose, the hairs being long and matted, rendering it difficult to spread the flower without tearing.

**QUERCUS PLATANOIDES.**—The flowers of *Q. platanoides* are only about one half the size of those of *Q. alba*, being 1–2<sup>mm</sup>, but resemble them closely in other respects. The

FIG. 3.—*Q. platanoides*.

texture of the perianth is thicker. It is rotate rather than campanulate, and forms a flat six-lobed disk at the base of the stamens. The lobes are broadly oval to ovate, and separated by broad and obtuse sinuses.

FIG. 4.—*Q. Prinus*.

The midrib is distinct nearly to the apex of each lobe. The perianth is pilose, but the hairs are not so thickly matted as in *Quercus alba*.

**QUERCUS PRINUS.**—The perianth of *Q. Prinus* is small, thin, and deeply lobed. The diameter is from 2–2.5<sup>mm</sup>. It resembles the flowers of *Q. alba*, but the sinuses are much deeper and narrower, and the



lobes are more spatulate or obovate. There is also a variation in the number of lobes; in the majority of flowers examined there were from six to eight, but occasionally one was found with as many as ten. The midrib is distinct at the base, but disappears near the apex of the lobes.

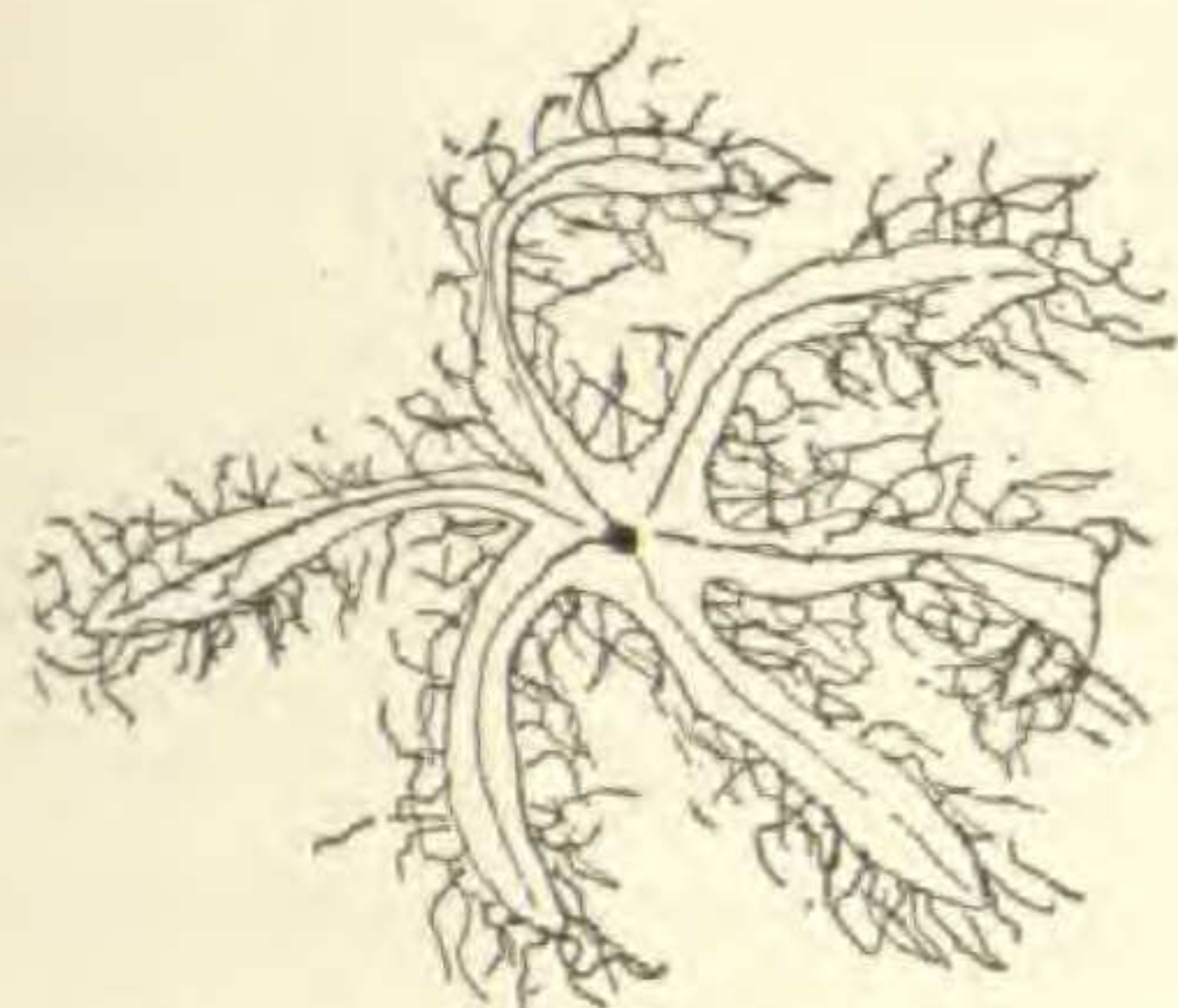


FIG. 5.—*Q. macrocarpa*.

The perianth is sparingly pilose, with the lobes ciliated by long slender hairs, giving it a very shaggy appearance.

**QUERCUS MACROCARPA.**—*Q. macrocarpa* has a very characteristic flower. It is more deeply lobed than any of the preceding species, the sinuses



FIG. 6.—*Q. rubra*.

extending nearly to the point of attachment. It is the largest of this group, having a diameter of 3–3.5<sup>mm</sup>. The lobes are long and very narrowly linear, five or six times as long as they are wide, and are frequently slightly curled or twisted, making it difficult to separate them from the filaments of the stamens. The midrib is distinct to the apex of the lobes. The perianth is pilose, the hairs being very long and shaggy.

**QUERCUS RUBRA.**—The flowers of *Q. rubra* are much larger than any of the other forms studied, having a diameter of 4–4.5<sup>mm</sup>. They are campanulate and indistinctly five or six-lobed. As the flowers

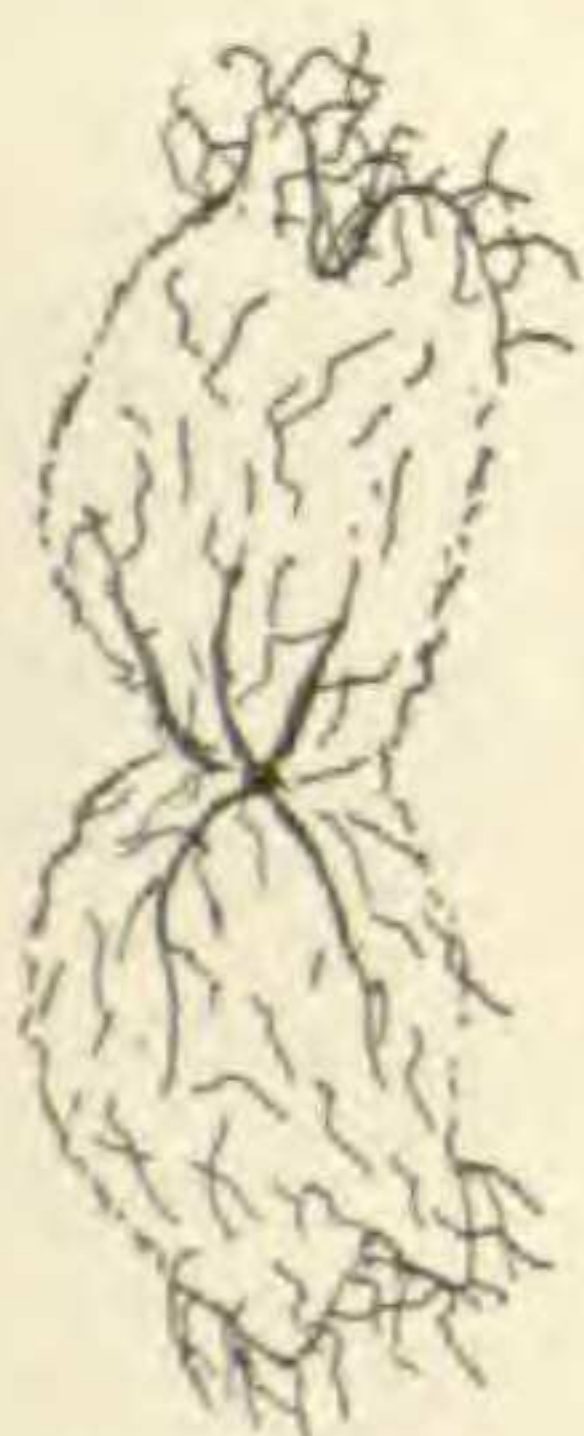


FIG. 7.—*Q. coccinea*.

develop the stamens push through the narrow throat and tear the perianth into uneven segments varying in number from two to six. The midrib is distinct and slightly thickened at the base, but becomes indistinct about half way to the apex of the lobes. The perianth is nearly smooth or slightly pilose, and the lobes are thinly ciliate with long hairs.

**QUERCUS COCCINEA.**—*Q. coccinea* has a perianth that very closely resembles the one just described, although the other characters of the tree are more frequently confused with *Q. velutina* than with *Q. rubra*. The perianth is campanulate and slightly six-lobed, with a diameter of 3.5–4<sup>mm</sup>. Its four or five stamens as they develop tear it into two or three irregular segments. The midrib is distinct at the base but very soon disappears. The perianth is pilose, and there is a thicker row of cilia along the margin than was found in *Q. rubra*.



QUERCUS VELUTINA.—The last of this series, *Q. velutina*, has a very closely campanulate, thin and delicate perianth. The diameter is the



FIG. 8.—*Q. velutina*.

same as in *Q. coccinea*, 3.5–4<sup>mm</sup>. The midrib is entirely wanting. The perianth is pilose, and the cilia along the margin are long and matted. The throat of the perianth is so narrow that it is torn by the stamens, as soon as they begin to develop, into two or three nearly equal segments. In the majority of cases the perianth had separated into two equal segments, but occasionally one was found with three, never with more.

The results of this study show that there is marked variation among the flowers, not only in the case of the large groups, but also among the species in each, and the following key was based on these characters:

KEY TO NATIVE OAKS BASED ON THE STAMINATE FLOWERS.

A. Stamens six to nine.

I. Bract persistent after anthesis . . . . . *Q. acuminata*

II. Bract deciduous before anthesis.

a. Perianth deeply lobed.

1. Lobes narrowly linear . . . . . *Q. macrocarpa*

2. Lobes obovate or spatulate . . . . . *Q. prinus*

b. Perianth with shallow lobes.

1. Perianth slightly campanulate: diameter 2–3<sup>mm</sup> . . . . . *Q. alba*

2. Perianth rotate: diameter 1–2<sup>mm</sup> . . . . . *Q. platanoides*

B. Stamens four or five.

I. Midrib wanting . . . . . *Q. velutina*

II. Midrib present.

a. Perianth pilose . . . . . *Q. coccinea*

b. Perianth smooth with lobes thinly ciliate . . . . . *Q. rubra*

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